be heartily congratulated on his work, which is interesting and readable from start to finish; while the illustrations, reproduced from his own photographs, are in most cases exquisite, as our readers may see for themselves from the two examples furnished herewith. Although he appears to have little or nothing new to record, Mr. Ward is evidently a careful and accurate observer, with the faculty of recording his facts in language that "can be understanded of the people."

With the exception of one chapter on the hydra and a second on the "tongues" of molluscs, Mr. Ward's work is restricted to insects and plants. In his opening chapter he details the fascinating life-history of the orange-tip butterfly, showing how its coloration harmonises with the plants it frequents, and how the beautiful green mottling on the hind wings is produced by the blending of dots of black and yellow. As an example of the author's skill in microscopic photography, we reproduce from this chapter his enlarged figure of the egg of the butterfly in question.

Another chapter we have read with special interest is the one on the gorse, in which the author points out how this plant retains evidence of its relationship to the clovers in the form of its seed-leaves; while he also suggests that the broom may be regarded as in some degree representing a plant in course of evolution to the gorse type, but that its career to this goal has been checked by the fact of its having a bitter taste, which renders its leaves, unlike those of the gorse, uneatable by cattle, so that a protective panoply of spines is superfluous. As a specimen of the author's exquisite photographs of plants, we reproduce the one showing the broom in blossom. Of the other chapters dealing with plants, one is devoted to their hairs and scales, in the course of which the author expresses his belief that he has brought to notice a hitherto undescribed type (in the Auricula); a second chapter is accorded to the sensitive plant, a third to the flowers of woodland trees, a fourth to plant-battles, and a fifth to plants that catch flies.

Reverting to the zoological series, it may be mentioned that the devotion of two chapters to the biographies of a couple of nearly allied species of hawk-moth is perhaps an ill-judged arrangement, as giving too much importance to one group. Be this as it may, the chapter entitled "Living Files and Rasps," in which are described and figured the lingual ribbons of a number of species of gastropods, can scarcely fail to be generally interesting, although it would have been better had the author in every case particularised the genus and species to which his specimens pertain, instead of merely labelling them "snails." In the chapter on mosquitoes and gnats the author does his best to clear up the popular misconception with regard to these insects, and shows how the female, so far as mankind is concerned, is the source of all harm and evil.

While, as already stated, it is somewhat marred by errors and inelegances of style, the book as a whole may be pronounced decidedly interesting and attractive, and free from all cant and faddism.

R. L.

GERMAN EDUCATIONAL EXHIBITS AT ST. LOUIS.

THE German educational exhibit at St. Louis was, as is usual with German exhibits, remarkably complete, and to enhance its value a series of descriptive catalogues was issued. Among the science catalogues were three on scientific instruments, chemistry, and medicine respectively which have special interest for readers of NATURE. They are all on the same plan, and include a general introduction explanatory of the scope of the work, and a detailed account of the apparatus, &c., exhibited. They served a twofold purpose, that of informing visitors to the exhibition as to what there was to see, and also that of bringing together an account of the best products of German workmanship in the respective subjects of the catalogue.

In the catalogue of scientific instruments the introductory description is very full and of real use; special reference is made to novel instruments. Dr. Lindeck, of the Reichsanstalt, who edited the catalogue of the German exhibit in Paris in 1900, is responsible for this, while Dr. Krüss had charge of the section.

The description of the instruments which follows is arranged alphabetically according to the names of the exhibitors. The system of classification with cross references is somewhat less complete than that adopted in the 1900 catalogue, but by aid of the introduction it is easily possible to find any given kind of apparatus. A glance through the catalogue is sufficient to show its utility, and it is to be hoped that the support given to the proposed optical convention and exhibition in May next will be sufficient to justify the committee in issuing a catalogue of English optical goods which will serve the same purpose.

The chemical section at the exhibition contained a reading-room and library, and in this an interesting collection of alchemistic work was shown. Besides these most of the important modern German works on chemistry were to be found on the shelves. Two very interesting exhibits were the alchemistic laboratory, containing partly original apparatus, partly copies of old examples from the museum in Nuremberg, and the Liebig laboratory, a faithful copy of the well-known laboratory at Giessen. The rest of the exhibition illustrated modern chemical apparatus, methods and preparations.

The object of the medical exhibit is said to have been "to show how the German universities deal with the subject of medical instruction," and this was attained by judiciously grouping the articles shown, and by carefully selecting the apparatus. Naturally, various methods are adopted in the different branches; thus, in the department of internal medicine a complete clinical lecture on the diagnosis and therapeutics of tuberculosis is included, the objects required for demonstrating it being exhibited.

Among the apparatus, the microscopes and projection apparatus of Karl Zeiss occupy a prominent place. It is noteworthy that among the infectious diseases and disease germs tuberculosis comes first.

The catalogue contains a full list of the exhibits with some account of the principal among them, and it is clear that great pains have been taken to secure that the primary object of the exhibition should be carried out.

The three catalogues, in their completeness and orderly arrangement, are examples of the German plan of carrying the teaching and method of science into everyday life.

NOTES.

THE council of the Linnean Society has appointed a committee to consider the question of zoological nomenclature.

PROF. LANCEREAUX has been elected president for 1905 of the Société internationale de la Tuberculose.

THE Canadian Government has decided to place a Marconi wireless telegraph station on Sable Island. The station will come into operation by August 1 next.

M. PAUL LABBÉ has been appointed general secretary of the Paris Society of Commercial Geography in succession to the late Ch. Gauthiot.

MR. ALFRED BEIT has informed the honorary treasurers of the Institute of Medical Sciences Fund, University of London, that he has decided to increase the amount of his donation to the institute from 5000*l*. to 25,000*l*.

SENOR DON IGNACIO BOLIVAR, of Madrid, has been elected an honorary fellow of the Entomological Society. Profs. W. G. Farlow, H. S. Jennings, E. B. Wilson, and R. B. Wood have been elected honorary fellows of the Royal Microscopical Society.

THE King's Institute of Preventive Medicine was opened at Madras on March 11. The institute supplies animal vaccine to the whole of the Presidency, besides preparing curative and prophylactic sera. On the opening day there was an exhibition of bacteriological and sanitary engineering appliances.

A MOUNTED specimen of the great auk, formerly in the Hawkstone collection, has been sold by Rowland Ward, Ltd., of Piccadilly, to one of the American museums for 450*l*. This is the "record" price, the next highest being 350*l*. obtained some years ago by the same firm for a specimen now in a private museum.

DR. A. R. WALLACE recently presented to the British Museum a number of pencil drawings of fishes from the Rio Negro which were saved some fifty years ago at the time the veteran explorer's collections were burnt at sea on his return from the Amazonian journey. These drawings, some fifty in number, were exhibited at one of the meetings of the Zoological Society, when it was stated that while some of the species depicted had been identified, others appeared to be still unknown to science. This should stimulate investigation of the fish fauna of the Amazonian system.

M. JULES VERNE, whose works are better known in this country than those of any other French writer, died on March 24 at seventy-seven years of age. Jules Verne was one of the first novelists to recognise and utilise the store of scientific knowledge as a source of material from which attractive romances could be constructed. The charm of his style and the realism of his pictures have done much to encourage the study of science among boys and girls. Few writers, indeed, have produced healthier and more stimulating stories, or weaved fancy and fact together so successfully.

ON Saturday next, April 1, Lord Rayleigh will deliver the first of a course of three lectures at the Royal Institution on some controverted questions of optics. On Tuesday, April 4, Mr. Perceval Landon will give the first of two lectures on Tibet, and on Thursday, April 6, Prof. Meldola will commence his course of two lectures on synthetic chemistry, experimental. The Friday evening discourse on April 7 will be delivered by Mr. Alfred Mosely on American industry, and on April 14 by Lord Rayleigh on the law of pressure of gases.

THE Estimates for Civil Services for the year ending March 31, 1906, provide for education, science, and art, the total sum of 16,328,947*l*., being an increase of 533,409*l*. over the grants for 1904–5. There is an increase of 46,100*l*. for university colleges, the grant being raised from 54,000*l*. to 100,000*l*. Of the increase 416,790*l*. under Board of Education, the greater proportion must be described as automatic in character, due to the anticipated growth in the number of scholars in average attendance, and to the larger number of teachers for whose training provision is made by the State. The principal increase, 262,704*l*., is in respect of the elementary education grants. With a view to the further development of the National Physical Laboratory, Parliament is being asked to sanction an increase of 1500*l*. on the grant in aid of salaries and other expenses of the laboratory, and also an additional grant of 5000*l*. in aid of new buildings and equipment for the same institution. Further provision is also included for investigations in connection with the North Sea fisheries.

THE fourth International Ornithological Congress will be held in London in Whitsun week, June 12–17. The organising committee has been able to obtain from the University of London accommodation for the meeting at the Imperial Institute, and from the trustees of the British Museum the use of the Natural History Museum for the purpose of a conversazione on one evening of the week of the congress. The Prince of Wales has consented to become the patron; and the two honorary presidents are Prince Ferdinand of Bulgaria and Dr. A. R. Wallace, F.R.S. The president-elect of the congress is Dr. Bowdler Sharpe. The congress will be divided into general meetings and meetings of sections, of which there will be five, as follows:—(1) systematic ornithology; general distribution, anatomy and palæontology; (2) migration; (3) biology, nidification, oology; (4) economic ornithology and bird protection; and (5) aviculture. It is proposed to devote one day to an excursion to Tring to inspect the collection of birds belonging to Mr. Walter Rothschild. On June 16 the congress will be received by the Lord Mayor of London at the Mansion House. At the close of the proceedings in London, on the invitation of the Duke of Bedford, an excursion will be made to Woburn to view the collection of live animals in Woburn Park, and the following day will be spent at Cambridge, where Prof. Newton will welcome the members at Magdalene College. Finally, a journey has been planned to Flamborough Head, in Yorkshire, of special interest to ornithologists.

THE programme of arrangements for the Optical Convention shortly to be held in London is now beginning to assume a definite shape. The convention will be formally opened with an address from the president, Dr. R. T. Glazebrook, F.R.S., on the evening of Tuesday, May 30, and the gathering will extend over the four following days up to and including Saturday, June 3. The mornings will be devoted to papers and discussions, and in view of the interesting series of papers already announced, there is no doubt that this most important section of the proceedings will result in valuable contributions to optical science, and will fulfil the aims which those who have been active in promoting the convention have set before them. In addition to the papers, demonstrations of apparatus of special interest will be given in the afternoons in the laboratories of the department of technical optics of the Northampton Institute. An exhibition of optical and scientific instruments will be held at the Northampton Institute, and will be open from May 31 to June 3, both dates inclusive. The catalogue is now in active preparation. The arrangement made by the "exhibition and catalogue" subcommittee that each section should be dealt with by an expert in the construction of the instruments represented in the section, together with an independent scientific member of the committee, will ensure that all classes of instruments shall be adequately dealt with and described. In addition to the presidential address to be given on the evening of May 30, there will be an evening lecture by Prof. S. P. Thompson, F.R.S., on the polarisation of light by Nicol prisms and their modern varieties. On a third evening it is proposed to hold a conversazione, and for Saturday afternoon, June 3, a visit to the National Physical Laboratory is proposed. Further particulars will be announced later, when the programme is more definitely settled. The hon. secretary, Mr. F. J. Selby, Elm Lodge, Teddington, Middlesex, will be glad to hear from those wishing to join the convention.

IN an account of a journey to Lake San Martin, Patagonia, published in the *Geographical Journal* for March, Captain H. L. Crosthwait directs attention to the magnetic and meteorological observatory established by the Argentine Government on New Year Island—a small island situated in lat. 54° 59′ S., and about five miles off the north coast of Staten Island. The observatory, which is complete in every respect, is superintended by four Argentine naval officers, and is here illustrated from Captain Crosthwait's paper. The observatory was opened in February, 1902, and during the time which has since elapsed, the temperature conditions recorded there by the officers are:—highest temperature recorded, 55°·4 F.; lowest temperature, 16°·4 F.; annual mean temperature, 41° F. The magnetic observatory is kept at an almost constant temperature of 64° F. Many interesting facts about Tierra del Fuego are given by Captain Crosthwait in his paper. He directs attention to the astonishing number and variety of the glaciers, and to the fact that most of the larger ones show signs of shrinkage. Of San Martin Lake he says it undoubtedly occupies what was once a strait joining the Atlantic and Pacific Oceans. The level of the water of the lake rises and falls in a peculiar manner. Exact measurements of these "seiches" show that the movements are irregular, but on an average they amount to about five inches, having a period of about four minutes between two successive high waters. The surface of the water to the eye is perfectly smooth.

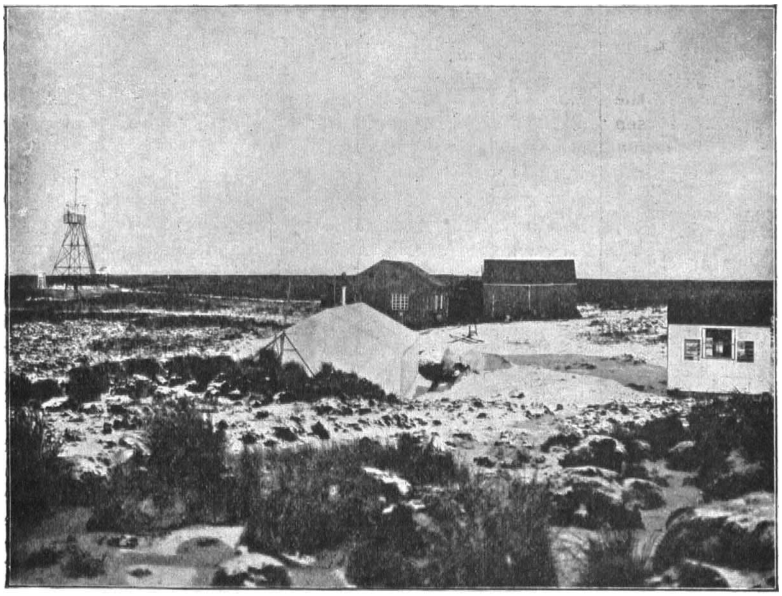

FIG. 1.—Magnetic and Meteorological Observatory, New Year Island.

THE "Fauna of New England," in course of publication by the Boston Society of Natural History, has reached its fourth part, which is devoted to the echinoderms, the author being Mr. H. L. Clark.

BEAVER-DAMS on the Slate River, Colorado, form the subject of a paper by Mr. E. R. Warren in the *Proceedings* of the Washington Academy (vol. vi. p. 429), in the course of which the author shows how largely these rodents have altered the features of the valley.

IN the *Biologisches Centralblatt* of March 1, Mr. S. J. Wasmann continues the account of his theory of the origin of slavery among ants, Mr. H. Prandt discusses reduction processes and "karyogamy" among infusorians, while Prof. von Hansemann reviews the so-called heterotype cell-formation in malignant tumours, more especially in connection with the recent cancer investigations of Messrs. Farmer, Moore, and Walker.

To the *Proceedings* of the Boston Society of Natural History (vol. xxxii., No. 3) Miss Emerson contributes an account of the anatomy of *Typhlomolge rathbuni*, the blind salamander first made known by specimens thrown up by an artesian well in Texas in 1894. Despite its external resemblance to the olm (Proteus) of the Carniola caves, the author is of opinion that the creature is a member of the family Salamandridæ, and most nearly related to the American Spelerpes.

THREE American publications on fishes have reached us this week. In the first Messrs. Jordan and Starks (*Proceedings* U.S. Nat. Mus., No. 1391) describe a collection from Corea, containing several new generic and specific types, while in the second (*loc. cit.*, No. 1394) Mr. T. Gill discusses the generic characters of Synanccia and its allies. Of more general interest is the much larger memoir by Dr. S. E. Meek on the fresh-water fishes of Mexico north of the Isthmus of Tehuantepec, issued in the zoological series of the publications of the Field Columbian Museum (vol. v.). In this memoir, which is very fully illustrated, the author discusses the physiography of Mexico in connection with its fish fauna in considerable detail.

IN July, 1902, Dr. Merkel, of Wiesloch, was fortunate enough to discover in an overflow of the Leimbach a large number of the generally rare phyllopod crustacean *Limnadia lenticularis*. The specimens then collected form the basis of a paper on the anatomy of this species by Mr. M. Nowikoff, which appears, with numerous illustrations, in vol. lxxviii., part iv., of the *Zeitschrift für wissenschaftliche Zoologie*. In the same issue Mr. L. Cohn describes the subocular tentacle of the remarkable frog *Dactylethra calcarata*, the function of which, in the absence of living specimens, cannot yet be definitely determined. The third article in this part forms the completion of the account by Mr. F. Voss of the anatomy of the thorax of the house-cricket, with special reference to the comparative anatomy and mechanism of the organs of flight in insects generally.

IN the second part of an essay on the structure and relationships of the opisthocœlian, or sauropod, dinosaurs, issued in the geological series of the Field Columbian Museum publications (vol. ii., No. 6), Mr. E. S. Riggs dissents from the view that these gigantic creatures were semi-aquatic, or at least marsh-haunting in their habits. Although the massiveness of their vertebræ recalls cetaceans, yet there is no trace in the latter group of the lightening of this part of the skeleton by means of hollowing and fluting which is so characteristic of these reptiles. More important evidence is afforded by the structure of the limbs, which appears to conform strictly to the terrestrial type. The species described in this paper, *Brachiosaurus altithorax,* is regarded as the type of a family characterised by the great relative length of the fore-limb, the humerus in this genus being as long as the femur.

FROM Dr. Florentino Ameghino we have received a copy of a paper published at Buenos Aires entitled "Nuevas Especies de Mamíferos, Cretáceos y Terciarios, de la República Argentina," and purporting to be a reprint from vols. lvi.–lviii. of the *Anales* of the Scientific Society of Argentina. It contains a large number of new generic and specific names, which in the absence of illustrations can scarcely be regarded as of much scientific value; and it may be suggested that, despite their admitted richness, the Argentine extinct faunas can scarcely include such a number of forms as the author would have us believe. Moreover, we feel sure that naturalists will display great reluctance in admitting the occurrence of ancestral forms of Tragulus and Galeopithecus in the Argentine Tertiaries, while they will most certainly refuse to follow the author in regarding the latter genus as a member of the Typotherium group of ungulates.

WE have been favoured with a copy of the *Schriften* of the Philosophical Society of Danzig for 1904 (new series, vol. xi., parts i. and ii.). To the naturalist the most interesting of its contents is perhaps the long article by Dr. W. Wolterstoff, director of the Magdeburg Museum, assisted by several specialists, on the fauna of the districts of Tuchel and Schwetz, in west Prussia ("Beiträge zur Fauna der Tucheler Heide"). A systematic zoological survey of this well-wooded area appears to have been undertaken in 1900, and the general results of this are summarised in the introductory chapter. Specialists are responsible for the determination of the specimens collected, Captain Barrett-Hamilton having undertaken this duty in the case of the mammals, represented only by three mice and one vole. The amphibians receive special attention, a coloured plate indicating the distinctive features of *Rana esculenta* and *R. arvalis*.

THE nuclear divisions in the embryo sac of *Fritillaria imperialis* have been studied by Dr. B. Sijpkens, who has published his results in the *Recueil des Travaux botaniques neerlandaises,* No. 2.

THE scope of plant morphology, and the nature of the fundamental problems in this subject which await investigation at the present day, could have no better exponent than Prof. Goebel, who has expressed his views in the *Biologisches Centralblatt* (February). Distinction is drawn between structural morphology, originally based upon systematic study, but later concerned with comparison and phylogeny, and causal morphology, which, inquiring into circumstances and conditions, can only be determined by experiment. The question whether a sporophyll is a modified leaf, or a vegetative leaf a sterilised sporophyte, is not without interest to botanists, but whether it is possible to control development and produce at will a vegetative life or a sporophyll is a problem of much greater significance.

AMONGST American horticulturists engaged in plant breeding with the object of improving certain definite characters of flowers and fruit, Mr. L. Burbank, of California, holds a high position. The improvement of plums by hybridisation and selection is a subject which has received much attention, and by crossing the Japan plum with American species he has produced such fine varieties as the Golden, Climax, and the Wickson. More remarkable are the raspberry-blackberry hybrids, of which the Primus, a cross between the western dewberry and the Siberian raspberry, ripens its fruit several weeks before either of its parents, and is superior in productiveness and size of fruit. The first part of an appreciative article by Mr. W. S. Harwood appears in the *Century Magazine* for March.

WE have received a copy of the observations made at the Hong Kong Observatory in the year 1903. In addition to the usual tables for the year in question, the report contains a valuable summary of hourly and monthly results of the various elements for the ten-yearly period 1894–1903. During this period the maximum shade temperature recorded was 77°, in August, and the minimum 37°·5, in January, and the highest solar radiation was 160°·1, in September. The greatest daily rainfall was 10·19 inches, and the maximum hourly fall was 2·86 inches. A comparison of the daily weather forecasts with the weather subsequently experienced gave a total and partial success of 92 per cent. The extraction of observations from the logs of ships for the construction of trustworthy pilot charts has been continued; the number of days' observations collected during the year was 9428. This useful work is undertaken by Miss Doberck.

THE rainfall of the six months September, 1904, to February, 1905, is summarised in *Symons's Meteorological Magazine* for March, and forms an interesting supplement to the account we published last week from the official reports of the Meteorological Office. The results obtained from fifty-five representative stations are tabulated, and referred to the average rainfall of the thirty years 1870–1899, and although, as Dr. Mill points out, the circumstance is not unprecedented, it very rarely happens that the general rainfall of the country remains below the average for each of six consecutive months. The great advantage of graphical representation in dealing with such data is clearly shown by the map which accompanies the discussion; from that it is seen at a glance that while the rainfall for the six months reached, and even slightly exceeded, the average over a narrow strip in the west of Scotland, and amounted to 75 per cent. in the north of that country, in the north-west of Ireland, in the English Lake district, and a small part of the Welsh coast, all the rest of the British Isles had less than three-quarters of the usual fall. In two large areas it fell short of 50 per cent. of the average, viz. in the south-east of Scotland and in the midland counties of England. Taking each country separately, the rainfall of the six months was:—for England and Wales 60 per cent., Scotland 78 per cent., and Ireland 75 per cent. of the average for the thirty years referred to. The necessity of economising the water supply had already made itself felt in several large towns within the dry area before the end of February.

PROF. G. TORELLI, of Palermo, contributes to the Naples *Rendiconto* (physical and mathematical section), x., 12, some new formulæ for calculating the totality of prime numbers below a given limit. The formulæ are non-asymptotical, and they are applicable to an arithmetical progression as well as to natural numbers.

IN the *Annals of Mathematics* for January, recently received, Prof. G. A. Bliss discusses the proofs of the existence of solutions of the differential equation of the first order in terms of initial values, and Prof. L. Wayland Dowling discusses the conformal representation of triangles, with special reference to cases in which the solution can be represented by hyperelliptic integrals of given deficiency.

In a contribution to the Berlin *Sitzungsberichte* (1904, lii.), read December 8, Prof. Leo Koenigsberger discusses the extension of the principle of energy to a system having a kinetic potential of any order, and any number of variables dependent and independent. The paper forms a continuation of Prof. Koenigsberger's researches on the dynamics of systems in which *time,* instead of being one dimensional, may be of two or more dimensions.

Prof. Garbasso has published a short note (Genoa, Angelo Ciminago, 1904) in which he proposes a new theory to account for the duplication of lines in the spectra of variable stars. According to this theory, it is assumed that the phenomena are due to the presence of an element the atoms of which are formed of two separate conductors, and that these atoms are mostly in a state of dissociation. The paper consists of a mathematical investigation of the periods of a system of electric oscillators forming a model of the supposed atoms.

In 1890 a paper was presented to the Lincei Academy by Prof. Filippo Keller entitled "An itinerary guide to the principal magnetic rocks of Latium," of which only an abstract was printed. Since Prof. Keller's death in 1903 the complete paper has been brought out by Dr. G. Folgheraiter as No. 11 of his series of *Frammenti* dealing with the geophysics of the environs of Rome. It is accompanied by a map of the district and a portrait and biographical notice of Keller, the latter by Prof. S. Günther. It is printed by Panetto and Petrelli, of Spoleto.

The *Revue générale des Sciences* for February 28 contains a reprint of the paper read at Breslau by Dr. A. Kohler (Jena) on photomicrography by ultra-violet-light. It is illustrated by figures showing the arrangement of the microscope and camera, and the illuminating apparatus. It is pointed out that, independently of the increase of resolving power, ultra-violet light often affords a method of differentiating between organic tissues in virtue of their different degrees of transparency to the rays, and, further, it in some cases can be used to excite interesting phenomena of fluorescence in microscopic objects.

The *Atti dei Lincei;* xiv. (1) 3, contains a short account of some experiments by Mr. Alessandro Artom on wireless telegraphy with the use of circular or elliptically polarised waves. The experiments were divided into four groups, and in every case established the predicted property that it would be possible to send methods in definite directions by the use of these waves. Thus, in the last series of experiments, signals were sent from Monte Mario (Rome) to the island of Maddalena without any effects being noticed at the island of Ponza, which is situated some way off the line joining the first two stations. Further, it appears that with the use of circular waves the height of the aërial conductors can be reduced.

The ninth supplement to the present series of *Communications* from the Physical Laboratory of the University of Leyden contains an address delivered in commemoration of the 329th anniversary of the University of Leyden by Dr. H. Kamerlingh Onnes, Rector Magnificus of the university. It deals with the importance of accurate measurements at very low temperatures, a need which, it is pointed out, was first appreciated by Boyle. An important application of such observations has arisen in connection with van der Waals's theory of corresponding states, and Dr. Onnes points out that further researches at low temperatures are required for the problems of the mechanism of the atom that have been forced upon us by recent discoveries. Dr. Onnes emphasises the very important work done by Dewar in rendering such low temperature observations possible.

"Mathematical Progress in America" forms the subject of Prof. Thomas B. Fiske's address to the American Mathematical Society published in the *Bulletin* of the society for February. Prof. Fiske divides the history of pure mathematics in America into three periods, the first extending up to the foundation of the Johns Hopkins University in 1876, the second extending from 1876 to 1891, when the New York Mathematical Society was converted into the present American Mathematical Society and began to issue the *Bulletin,* and the third covering recent times. The *Bulletin* contains, further, the continuation of the report on last summer's congress at Heidelberg by Dr. E. B. Wilson, and a report of the meeting of the Deutsche Mathematiker Vereinigung by Mr. R. E. Wilson. The *Bulletin* thus furnishes a summary of mathematical progress of a cosmopolitan character such as does not exist in this country.

Of the increasing attention which is being devoted on the Continent to the history of the sciences, and in particular to that of mathematics, abundant proof is afforded by vol. xii. of the *Atti* of the International Congress of Historical Sciences, which met in Rome in April, 1903. This volume is devoted entirely to the proceedings of the section which dealt with the history of mathematical, physical, natural, and medical sciences, and it occupies 330 pages. It includes general discussions by Prof. Elia Millosevich on the iconography of solar eclipses, by M. Paul Tannery dealing with proposals for advancing the history of science, some remarks by Messrs. D. Barduzzi, P. Giacosa, and Gino Loria on the introduction of university courses on history of sciences, and proposals by Prof. Gino Loria for the publication of Torricelli's works, and by Prof. Pietro Giacosa for a catalogue of the scientific manuscripts in Italian libraries and archives. Among the papers read, the two mathematicians associated with the solution of the cubic, Tartaglia and Cardan, receive mention at the hands of Mr. Tonni-Bazza and Prof. Moritz Cantor; Prof. M. Darvai deals with the life of Bolyai; Prof. A. von Braunmühl contributes an interesting paper on the history of the integral calculus; Prof. R. Amalgià writes on early theories of the tides; Prof. Icilio Guareschi on the alleged plagiarisms of Lavoisier. Altogether the volume contains no less than thirty-four papers.

Attention has already been directed to the important series of papers on applied mathematics now being issued by Prof. Karl Pearson, F.R.S., under the title "Drapers' Company Research Memoirs." Two further numbers have now reached us. One of them is the fourteenth of Prof. Pearson's mathematical contributions to the theory of evolution, and deals with skew correlation and non-linear regression. The highly specialised character of the work may be inferred by quoting one of four conclusions on p. 53:—"The correlation between auricular height of head and age in girls is cubical, of nomic heteroscedasticity and of anomic heteroclisy. It is probably really a case of isocurtosis." The other paper is by Mr. L. W. Atcherley and Prof. Pearson, and deals with the graphics of metal arches. In it the authors point out the impossibility of applying purely graphical constructions with any degree of accuracy to the very flat metal arches used in modern bridges, and they propose a kind of "semi-graphical" method, depending partly on analysis and partly on graphics. Some interesting conclusions are drawn as to the relative merits of doubly pivoted, three pivoted, and doubly built in arches. These memoirs are rendered more accessible by being issued with their pages cut. They show what a lot of good work may be done by the expenditure by a public body of a very moderate sum on the endowment of mathematical research. We have another example of the same fact in the Cambridge Smith's prizes and the large number of former winners of these prizes who are now Fellows of the Royal Society.

The widely extended use of the freezing point and boiling point methods of molecular weight determination has been to a large extent rendered possible by the manufacture of sensitive thermometers of the now familiar Beckmann type. In the current number of the *Zeitschrift für physikalische Chemie* is a very interesting paper by Mr. Ernst Beckmann giving a complete history of the differential mercury thermometer, with especial reference to the modifications it has undergone since its first use in freezing point work. He mentions the fact that the original Beckmann thermometer was due to an accident. A costly instrument, divided into 1/100ths of a degree, was being carried in the hand down a corridor when it was broken in half by the sudden opening of a door. In order still to be able to use the thermometer, a small bulb was blown on above the capillary, and from this the present type was evolved through a series of instruments illustrated in the present paper. Some of the thermometers figured are masterpieces of glass-blowing, notably one combining a Beckmann and ordinary thermometer on one instrument.

Messrs. John Wheldon and Co. have sent us their latest catalogue of scientific books they have for sale. The catalogue includes many scarce sets of *Journals* and *Transactions*, as well as selections from the libraries of the late Prof. Everett, Dr. C. W. Siemens, and others.

The most recent addition to the report being issued by the Engineering Standards Committee is the "British Standard Specification and Sections of Flat-bottomed Railway Rails." Copies of the publication may be obtained from Messrs. Crosby Lockwood and Son. The price is 10*s*. 6*d*. net.

We have received from Mr. Nasarvanji J. Readymoney, of Bombay, a copy of a publication he has prepared entitled "An Outline of Descriptive, Defining Nature-History Tables, Illustrated; or Nature-History Research Thinking Tables; or Work of Genesis Minutely Tabulated." The object of the tables is to enable the student to summarise and classify "all events in nature or creation" in a philosophical manner.

The February number of the *Journal* of the Straits Branch of the Royal Asiatic Society has reached us from Singapore. Among other important papers we notice contributions by Dr. Charles Hose on various methods of computing the time for planting among the races of Borneo, by Mr. P. Cameron on descriptions of new species of Iphiaulax and Chaolta (Braconidæ) from Sarawak, Borneo, and by Mr. H. W. Firmstone on Chinese names of streets and places in Singapore and the Malay Peninsula.

A new and revised edition of the volume of Prof. W. Schlich's "Manual of Forestry" dealing with forest management has been published by Messrs. Bradbury, Agnew and Co., Ltd. The mathematical problems have been simplified, and some of the calculations have been shortened. The appendices have been considerably altered. In the preface to the new edition Prof. Schlich directs attention to the fact that the most urgent need of British forestry is the collection of statistics, which will enable the proprietor and his forester to gauge the economic value of forest operations. He insists that the fully equipped forester must have a good knowledge of mathematics if he is to secure the best results.

A new encyclopædia, prepared and printed by Messrs. T. Nelson and Sons, is to be published in forty fortnightly parts under the title of the "Harmsworth Encyclopædia." Three of these parts, each of 160 pages, have been received, and judging from these we do not hesitate to say that the complete work should be a useful aid to students and a responsive friend to general readers. So far as we have tested the parts received, we have found the information accurate and confined to essential points. Of course, it must be understood that within the limited space allotted to any subject only bare outlines can be described; but as references are in many cases given to authoritative works, inquiring readers may be led to pursue their search for information, inspired by what they find in this encyclopædia. The work is liberally illustrated, and as a convenient guide to information which men and women often seek to know it will be of service.

OUR ASTRONOMICAL COLUMN.

Astronomical Occurrences in April:—

April 4. 2h. Mercury at greatest elongation (19° 11′ E.).
5. 23h. Mercury in conjunction with the Moon. (Mercury 7° 28′ N.).
6. 6h. Jupiter in conjunction with Moon. (Jupiter 3° 35′ N.).
9. 11h. 4m. Minimum of Algol (β Persei).
12. 7h. 53m. Minimum of Algol (β Persei)
15. Venus. Illuminated portion of disc = 0·049; of Mars = 0·975.
17. 8h. 18m. to 9h. 12m. Moon occults η Virginis (mag. 4·c).
20–22. Epoch of Lyrid meteors (Radiant 271° + 33°).

Discovery of a New Comet, 1905 *a*.—A telegram from the Kiel Centralstelle announces the discovery of another new comet by M. Giacobini at Nice on March 26.

The position of the comet at 8h. 11·8m. (M.T. Nice) was R.A. = 5h. 44m. 14s., dec. = +10° 56′ 56″, and its daily movement in R.A. = +3m., in dec. −1° 15′.

This shows the object to be in the constellation Orion, about 6m. W. and 3° 34′ N. of Betelgeuse, or a little more than one-fourth the distance from Betelgeuse to Geminorum, along a straight line joining the two. Apparently the comet passed very near to Betelgeuse on March 29.

Comet 1904 *e* (Borrelly).—A continuation of the daily ephemeris for comet 1904 *e* is given by Dr. E. Strömgren in No. 4004 of the *Astronomische Nachrichten*.

The ephemeris extends from March 29 to May 4, and from it we see that on the first named date the comet will apparently be situated very near to ζ Aurigæ, and will have a brightness of 0·24. Travelling thence in an E.N.E. direction it will enter the constellation Lynx, its computed position on May 4 being R.A. = 7h. 0m., dec. = +45° 17′, whilst its brightness on that date will be 0·12. The brightness at time of discovery (about mag. 10) is taken as unity.

Observations of the Recent Eclipse of the Moon.—In No. 9 (1905) of the *Comptes rendus* is published a paper by M. Puiseux wherein he discusses a series of twelve photographs taken between 7h. 32m. and 8h. 12m. on the occasion of the partial lunar eclipse which occurred on February 19.

Amongst other conclusions he states that the apparent changes in the aspects of the circles Messier and Messier A are simply due to differences of illumination and not to